**Subject area/course**: Science/Chemistry

**Grade level/band**: 11

**Task source**: Summit Public Schools; Author: Trina Lee

**Biodiesel: Making and Selling**

**STUDENT INSTRUCTIONS**

1. **Task context**:

You are a scientific researcher and you have come up with a great idea for a new fuel. In order to make a fortune off your idea, you need to perfect your invention and then get people to buy it.

**Step 1: Planning.** You are part of a company whose goal is to create and sell a new fuel *–*Biodiesel! Get your company started by read about why biodiesel is important and worth investing the time and money to develop it as a commercial product (Item A). Next, plan your company strategy by figuring out how you are going to spend the money in your budget (Item B). Remember, your budget must cover all of your research and advertising expenses.

**Step 2: Perfect your idea.**You have an idea about a new fuel, but you are not completely sure how to make it work. In order to get your fuel ready to sell to the public you have to do two things:

* *Learn about what other scientists have done*. Scientists build on the research of others. Read several articles on how to synthesize biodiesel to get some ideas on what makes the perfect recipe.
* *Test out your ideas*. Once you have an idea of how to make biodiesel, work with your research group to make your product in the lab. You will probably need to make a few batches until you get the synthetic procedure just right (Item C). Using your research and the basic formula (Item C), modify the formula to make a better fuel. Don't forget to keep a detailed laboratory notebook so you remember what you did in each experiment.

**Step 3: Analyze your fuel.** Before you are ready to sell your new fuel, you need to make sure it is better than what people currently use. There are two main factors to consider:

* *Laboratory analysis*. Working with your research group to test your biodiesel for a variety of characteristics that make a good fuel and see how it compares to others. Continue to record your experiments in your laboratory notebook (Item D).
* *Economic analysis.* The physical and chemical properties are not the only important factors. Your fuel also needs to be affordable. Evaluate the costs of different fuel sources and compare findings with your research group.

**Step 4: Patent your results.** Scientists patent their results so that they have the rights to commercialize them, while preventing other people from making money on the same idea. Everything in step 4 will be completed independently (Item E).

* *Patent.* You will write a patent summarizing all of your data including your synthesis and analysis. Follow the chemistry lab report guidelines; this format is very similar to how real chemists publish their findings.
* *Patent agent review.*Before you can submit your final report, you need to have your work approved by a patent agent (one of your peers). The patent agent will give you feedback on how to make your writing stronger, but also on additional experiments you might need to have a complete patent.
* *Revise*. Based on the feedback from your patent agent you will need to revise your patent. This might include perfecting your writing but it also might mean doing a few more experiments in the lab.
* *Final publication.*After completing a rigorous review and revision process you are finally ready to publish your patent.

**Step 5: Commercialize your product.** People will not know that your fuel is the best available until you tell them about it (Item F).

* *Make an advertisement.* Work with a research group to make an advertisement for your fuel. Make a flier, billboard, radio commercial, TV commercial, or other product to capture the attention of your audience, and explain why your fuel is the best.
1. **Final product**:

You will publish a patent for your product and market your fuel to the class in the form of an advertisement.

**Additional Information**

1. **Knowledge and skills you will need to demonstrate on this task:**
* Constructing explanations and designing solutions
* Analyzing and interpreting data
* An understanding of chemical reactions and chemical equilibrium
1. **Materials needed:**
* Item A: Biodiesel Introduction
* Item B: Biodiesel Budget Constraints
* Item C: Biodiesel Synthesis
* Item D: Biodiesel Analysis
* Item E: Final Lab Report
* Item F: Final Commercial Instructions
1. **Time requirements:**

You will be working on this project over the next month during our study of chemical equilibrium. Ten class periods will be set aside for you to work on the various parts of the project.

1. **Scoring:**

Your work will be scored using the Summit Public Schools Biodiesel Rubric. You should make sure you are familiar with the language that describes the expectations for proficient performance.